
ILLINOIS' EFFORTS TO PROTECT BEACH PATRONS

Great Lakes Beach Conference
February 7, 2001
Chicago, Illinois

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Illinois Department of Public Health

Illinois Department of Public Health Responsible for Licensing Public Beaches Since 1974

- ! STATUTORY AUTHORITY - Illinois
Swimming Pool and Bathing Beach Act**
 - ! RULES - Illinois Swimming Pool and Bathing
Beach Code**
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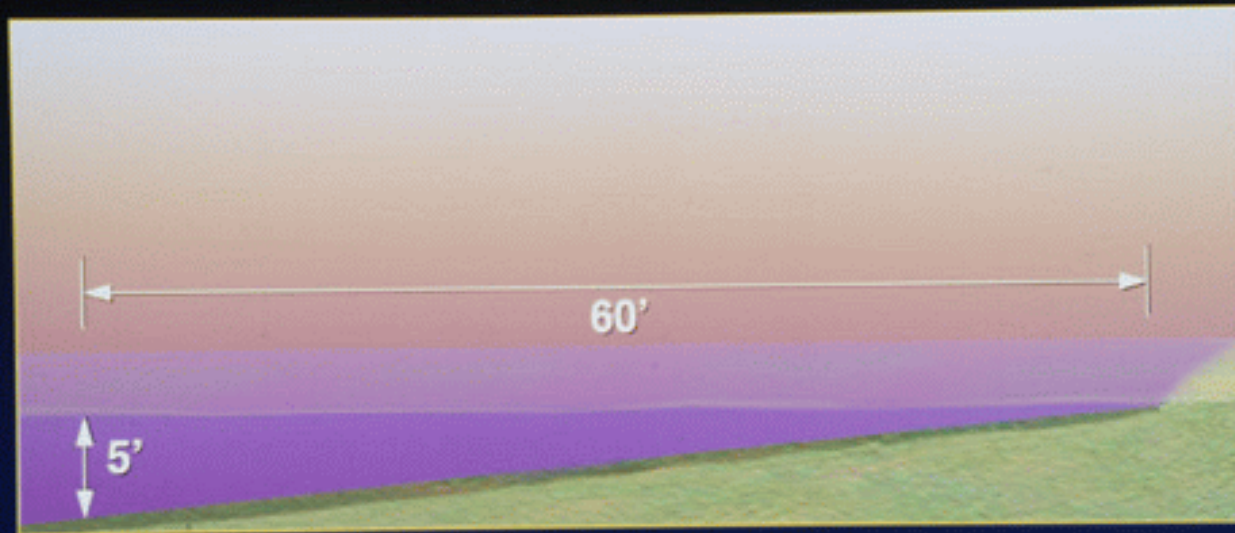
Law Excludes Beaches Operated by Municipalities Located on Lake Michigan

- ! City of Chicago regulates 32 beaches
 - ! Most of the 340 beaches licensed by IDPH are inland
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Annual Inspection Determines Compliance to Adopted Codes Which Include:

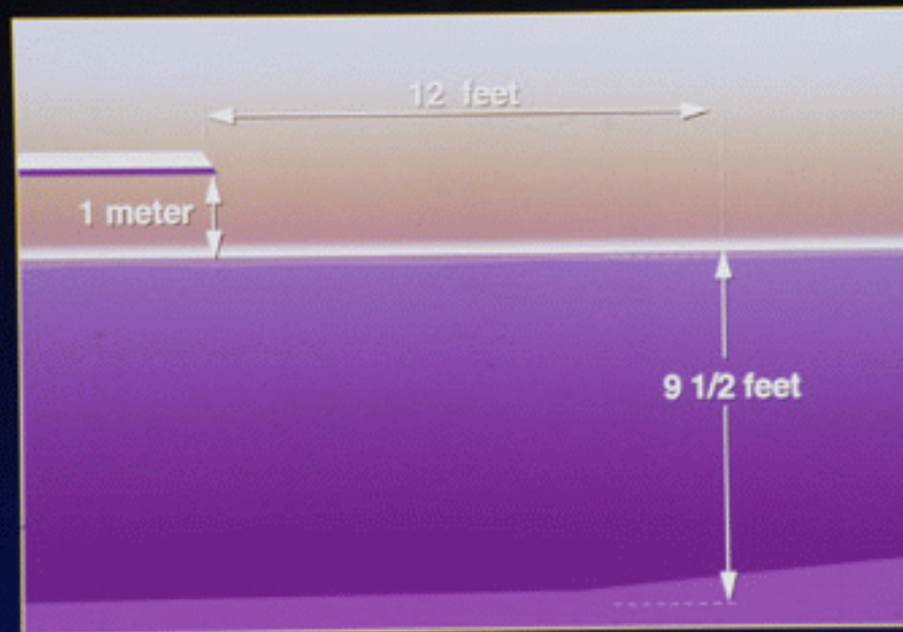
- ! Bottom Slope**
 - ! Buoy Line Separating Wading Area From
Swimming Area**
 - ! Outer Limit Markers**
 - ! Minimum Water Depth Around Diving
Facilities**
 - ! Toilet Facilities**
 - ! General Beach Sanitation**
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Bathing Beach Slope



Uniform slope with sand / gravel bottom in shallow area.
Maximum slope - one foot vertical for 12 feet horizontal.

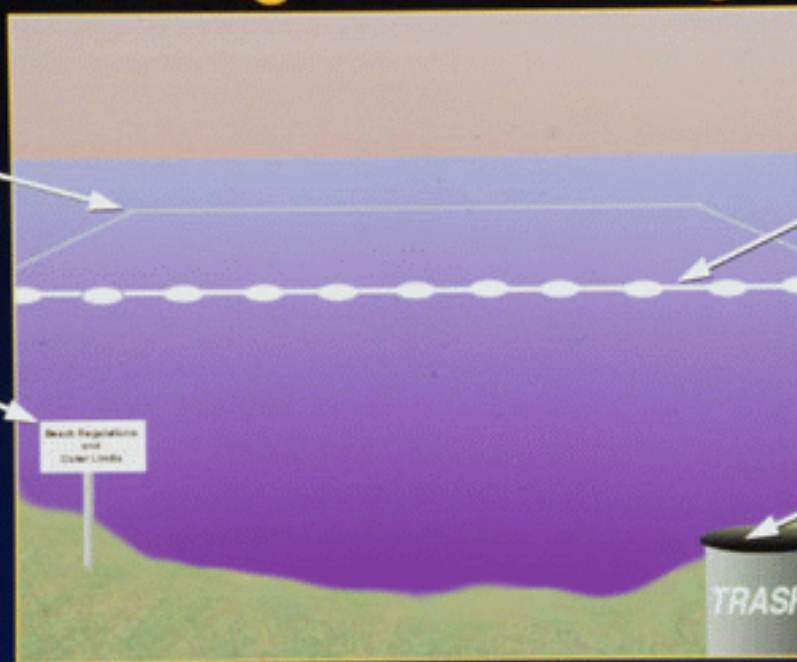
Diving Facility Requirements



Bathing Beach Design

Outer Limits
of the Beach

Sign posting
Outer Limits
and Beach
Regulations



Bouy line separating
swimming and wading
areas

Trash Bin

Construction Permit Required for New Beaches

Sanitary Survey Conducted to Evaluate Watershed

Water Samples Collected to Determine Initial
Water Quality

Original Water Quality Standards in 1974

Beach Must Close if Two Consecutive Samples Exceed:

- ! Coliform count of 5,000 per 100 ml
 - ! Fecal Coliform count of 500 per 100 ml
-

Outbreaks Reported at a Single Beach in 1992, 1993 and 1994

**Major Outbreak in 1995 of
E. Coli O157:H7**

Background

July 5, 1995

- ! Local health department received report of 6 cases of E. coli O157:H7 from a local hospital lab
 - ! 5 cases were < 12 years of age
 - ! All children swam at a lake on June 24 or June 25
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Incidence of EC O157:H7

- ! 21,000 cases per year in U.S.
- ! 250 deaths annually
- ! Only 2 previous lake-associated outbreaks in U.S.

Sources of Transmission

- ! Consumption of contaminated food
 - ! Consumption of or swimming in contaminated water
 - ! Direct person to person contact
-

Clinical Signs

- ! Diarrhea - bloody or nonbloody
- ! Abdominal Pain
- ! Vomiting
- ! Fever

Incubation Period

- ! Usually 3 to 4 days
- ! Can be as short as 1 day and as long as 8 days

Epidemiological Investigation

- ! Interview with cases indicated they all swam at Rock Cut State Park
- ! Initial case-control study to confirm an association between the lake and illnesses
- ! Second case-control study with lake swimmers to identify risk factors for illnesses

Case Definition

A resident or visitor to the Rockford area who between 6/25 and 7/1 had at least one of the following:

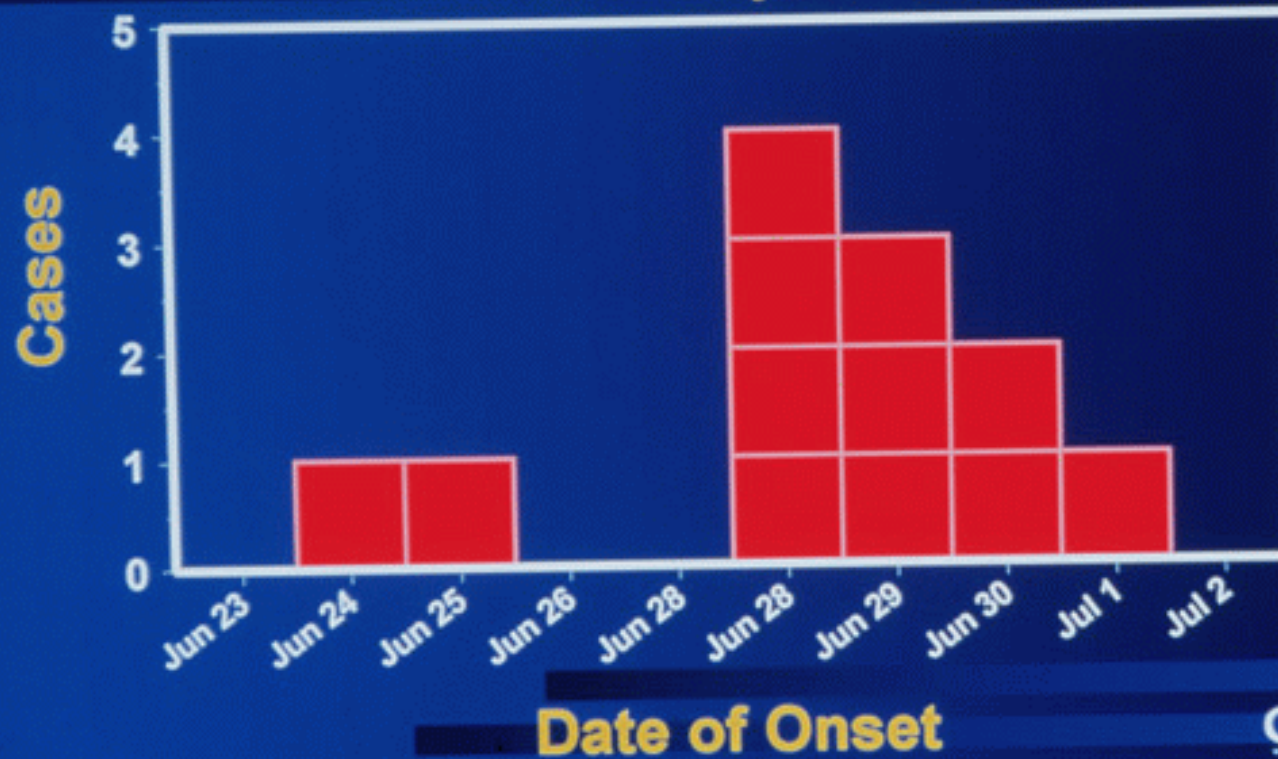
- ! Culture confirmed EC O157:H7
- ! Serologic confirmation of EC O157:H7
- ! Hemolytic uremic syndrome (HUS)
- ! Bloody diarrhea

Results - Initial Case - Control

12 individuals met the case definition

- ! 7 culture confirmed
- ! 1 culture confirmed with HUS
- ! 3 had positive serology
- ! 1 had bloody diarrhea with no culture

Cases of *E. coli* O157:H7 by Date of Onset June 24 - July 1, 1995



Results - Lake Swimmers Cases

Risk factors for illness

- ! Taking water into the mouth
- ! Swallowing water
- ! Length of time in water

Beach Sampling History

- ! 54 samples from 1990 to June 21, 1995
- ! Only 2 exceeded 500FC/100ml



Sample Results During Investigation

- ! Of 93 water and sediment samples collected, only 2 exceeded 500 FC/ 100ml
- ! 54 water samples, 18 sediment samples and 9 water fowl feces sampled for EC O157:H7, none detected







Environmental Investigation Results

- ! No problems with sewage or potable water supply
- ! No food service problems
- ! No problems detected with watershed
- ! Sample results did not reveal a problem

Conclusions

- ! Speculate that a swimmer on Saturday, June 24, who had an infection with a short incubation period contaminated the lake
- ! 12 children ingested the contaminated water and subsequently became ill
- ! Transmission took place on June 24 and June 25
- ! With 4700 people potentially exposed, the attack rate was only .25%

CAN ANYTHING BE DONE TO PREVENT FUTURE INCIDENTS

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Amendments to Rules Proposed

- ! Require infants to wear tight-fitting rubber or plastic pants
- ! Increase the number of toilets required
- ! Establish a maximum bather density of one bather per 25 square feet in shallow area
- ! Prohibit the feeding of wildlife or other action that encourages their presence

- ! Require the posting of a sign that advises against swallowing the water and prohibits ill persons from entering the water
- ! Changed the bacterial water quality levels for beach closure to two samples the same day that exceed either 500 FC/100 ml or 235 E. coli/100ml

Initiated a Sampling Program

- ! Required facility to collect a sample from the shallow end and one from the deep end and submit to Dept. Lab every other week
- ! Samples also collected by Department staff at time of annual inspection

Closing Criteria

- ! Beach is closed if both results exceed E.Coli of 235; if one of two exceeds these limits, resampling is required and if either of resample results exceed limit, beach is closed
- ! Closed beaches cannot reopen until two samples collected on the same day are below the limits

Bathing Beach Closing Results

- ! 1996 - 57 closings at 47 beaches
- ! 1997 - 38 closings at 36 beaches
- ! 1998 - 45 closings at 40 beaches
- ! 1999 - 55 closings at 50 beaches
- ! 2000 - 79 closings at 64 beaches

Results of Changes

- ! Only one report of illnesses associated with a licensed beach, and that was traced to malfunctioning sewage systems discharging to a subdivision lake where the beach is located
 - ! Believe there is a greater awareness of the dangers of swimming in natural bodies of water
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July 15, 1998 Telephone Call

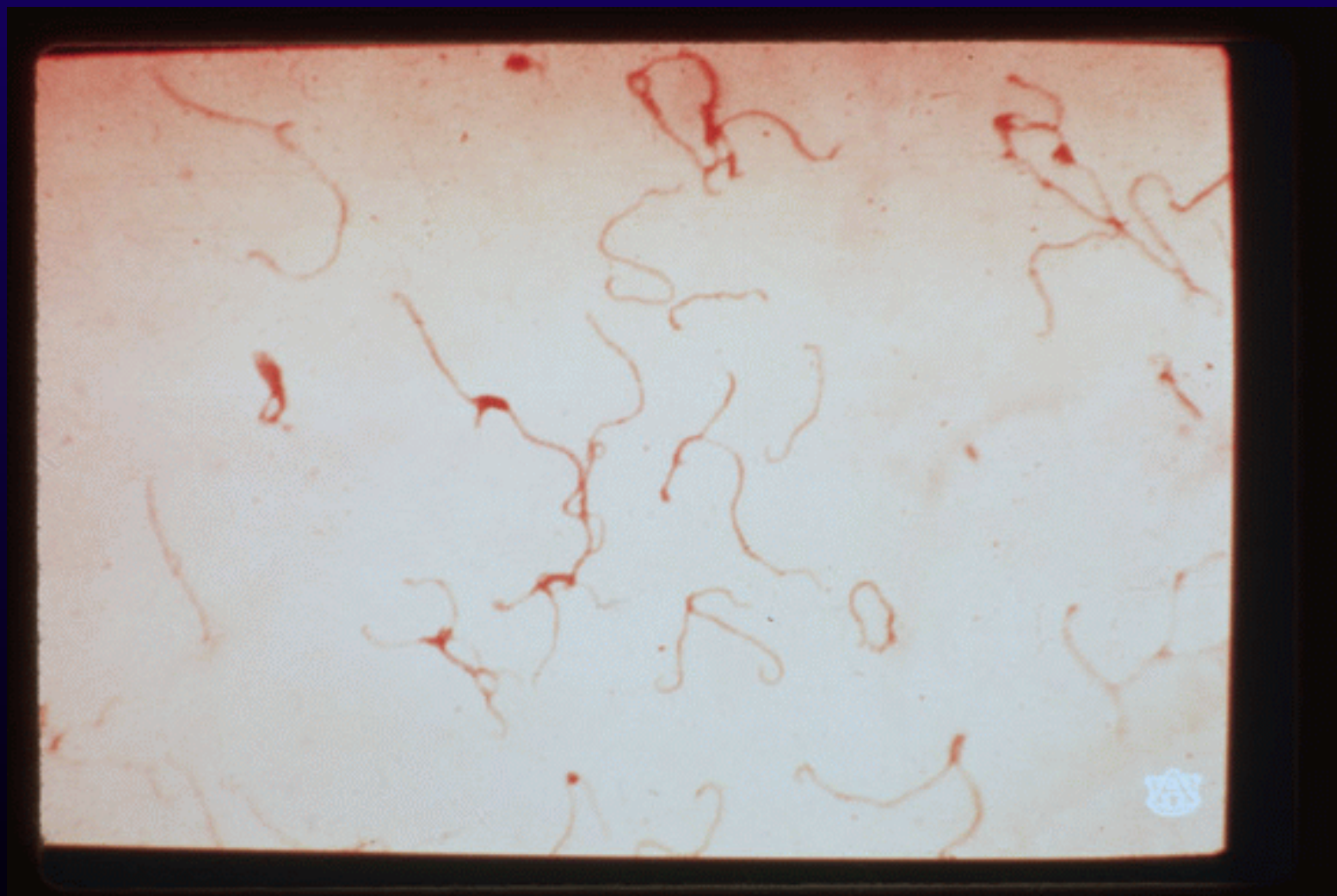
Wisconsin Division of Health

- ! 3 individuals hospitalized with acute febrile illness
- ! Onsets of illnesses July 6, 7, 10
- ! All 3 were triathletes
- ! 2 had participated in the July 5 Bally Total Fitness Triathlon in Madison, Wisconsin; all 3 had participated in Ironhorse Triathlon at Lake Springfield, Illinois, June 21

-
- ! Symptoms included fever, chills, headache, myalgia, diarrhea and eye pain
 - ! Leptospirosis was suspected
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What is Leptospirosis?

- ! Bacterial zoonosis transmitted by exposure to urine from infected animals
- ! Over 300 serovars of *Leptospira*
- ! Pathogenic leptospores do not multiply in water but survive for months
- ! Saprophytic leptospores multiply in water and persist indefinitely
- ! Exposure occurs through mucus membranes or open cuts
- ! Normally 100 cases annually in U.S





Infectious Concentrations



Raccoon urine contains
10 million organisms/ml



10 million organisms



Only 8 organisms needed to
become sick



Triathlon

Swim



1.5 Miles

Bike



45 Miles

Run

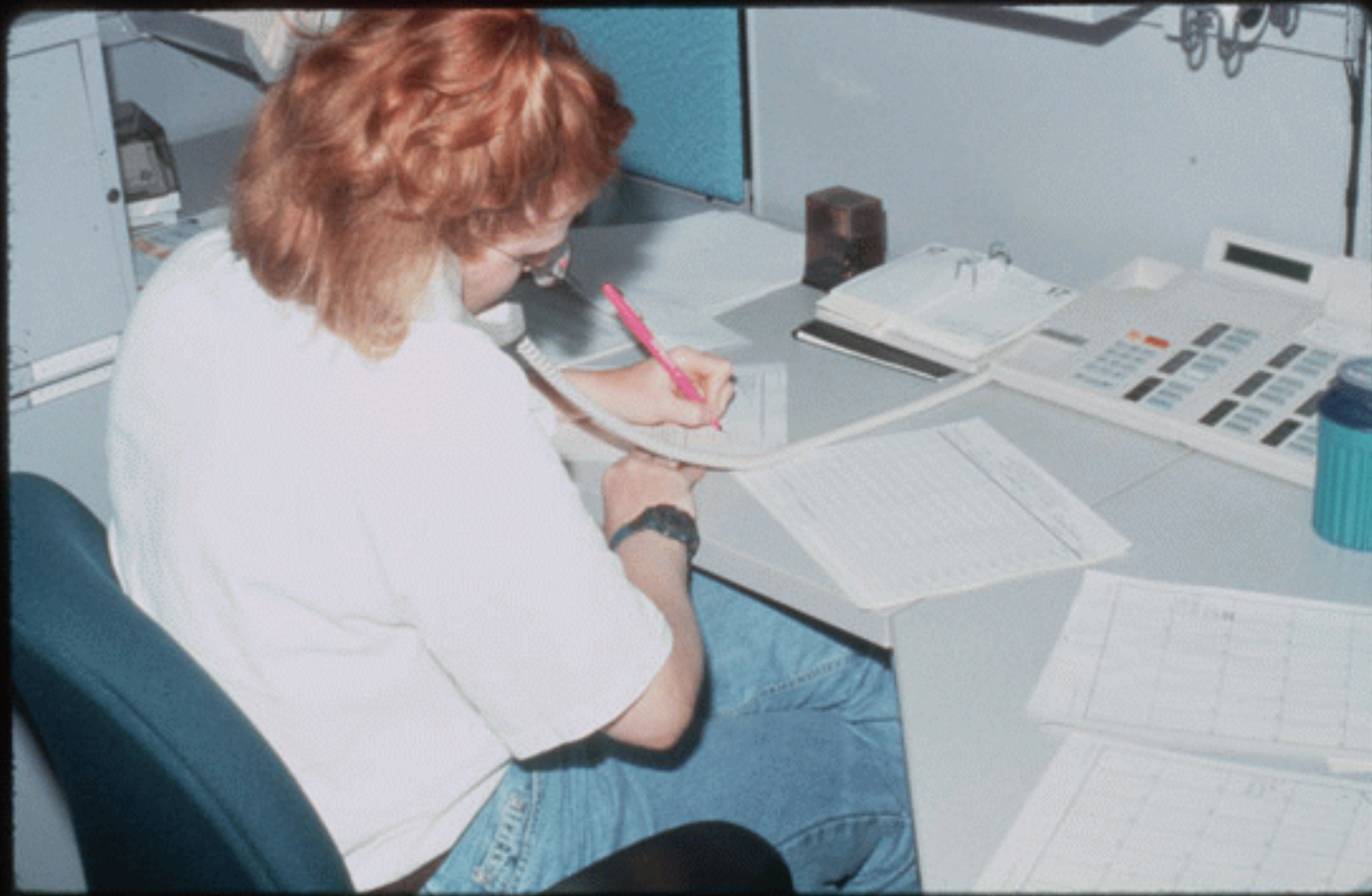


10 Miles



Springfield Triathlon Participants (n=875)





Case Definition and Diagnostic Testing

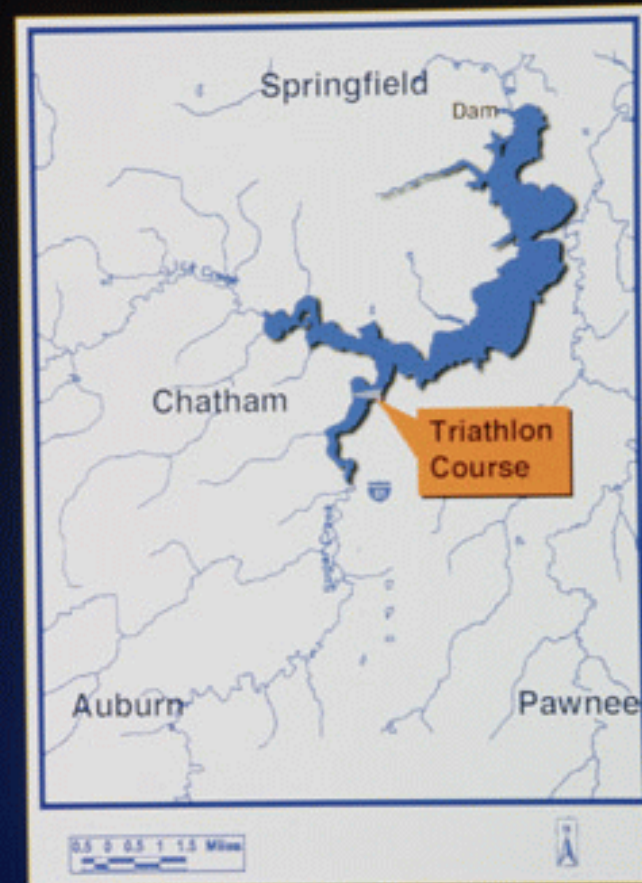
- ! Suspect Case: fever June 21 - July 22 plus two or more of the following symptoms: chills, myalgia, headache, diarrhea, red eyes, eye pain
- ! Confirmed Case: suspect case with positive ELISA, microagglutination test (MAT), immunohistochemistry stain (IHC), or culture

Public Health Measures

- ! July 18 advisory issued against water contact in area of lake where triathlon was held; 3 beaches ordered closed
- ! July 25 advisory extended to entire lake and 9 additional beaches closed

Lake Springfield

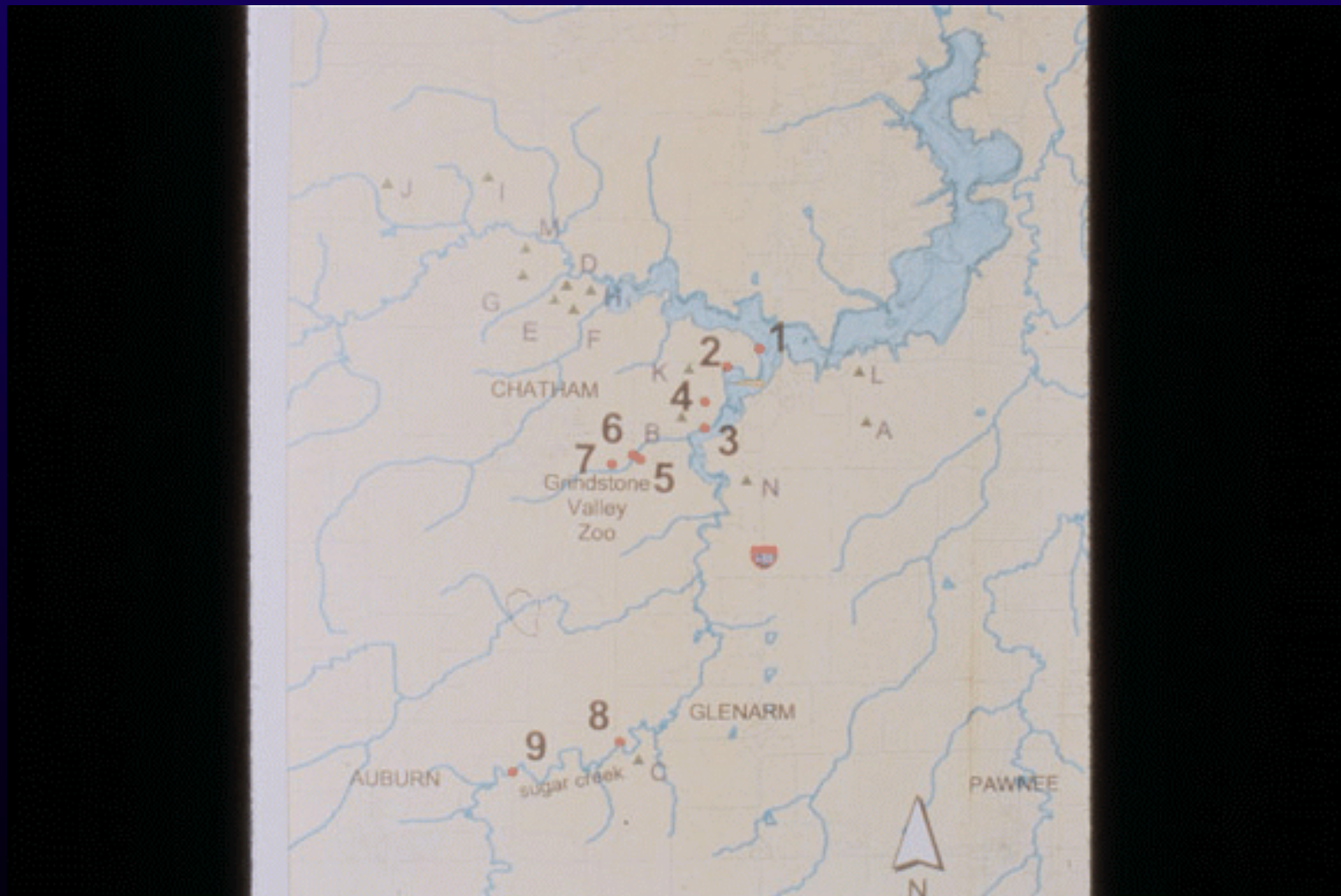
- 17 billion gallons
- 4,040 acres
- 57 miles of shoreline
- 265 sq. miles of watershed



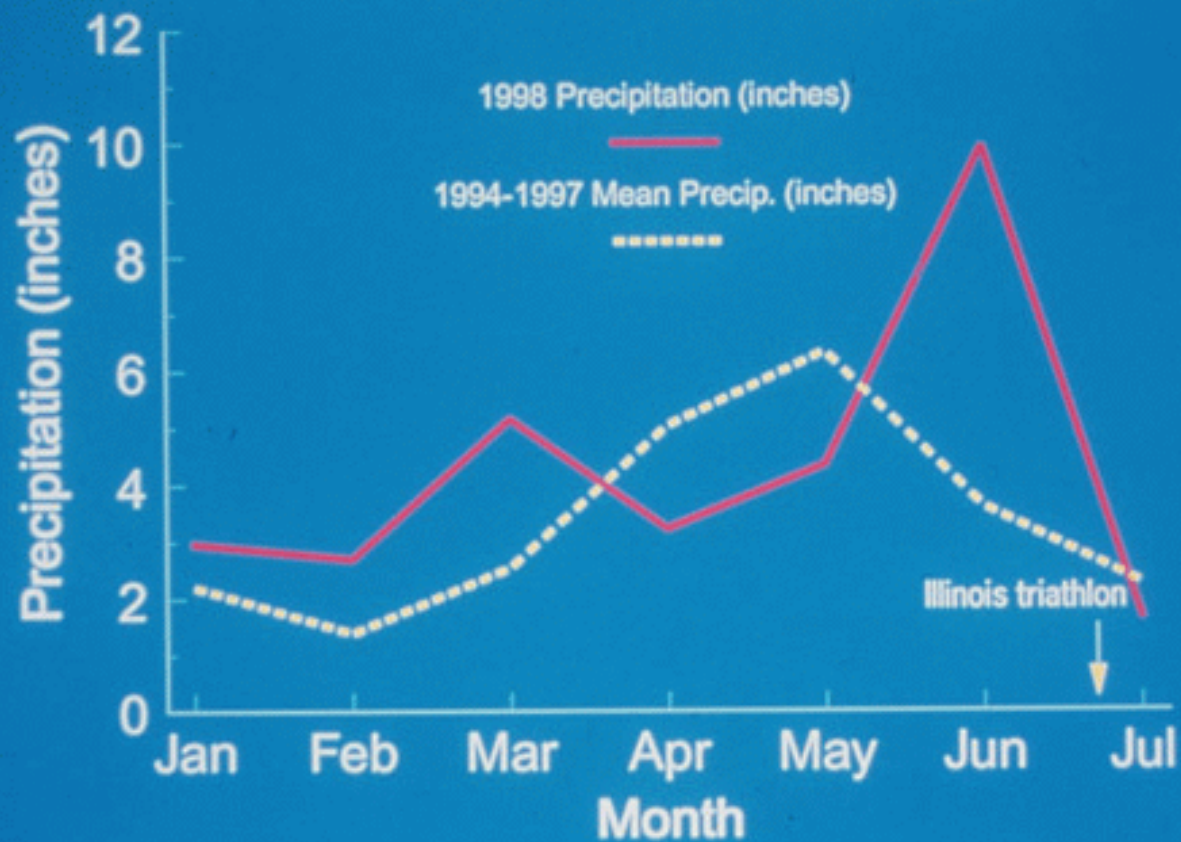


Environmental Investigation

- ! Nearly 100 water samples collected
- ! Nearly 500 tests conducted on the water samples
- ! Numerous soil samples analyzed
- ! Rainfall, lake flow, and past water quality analyzed
- ! Signs of leptospirosis were detected near the triathlon site one month after race, but no positive test results

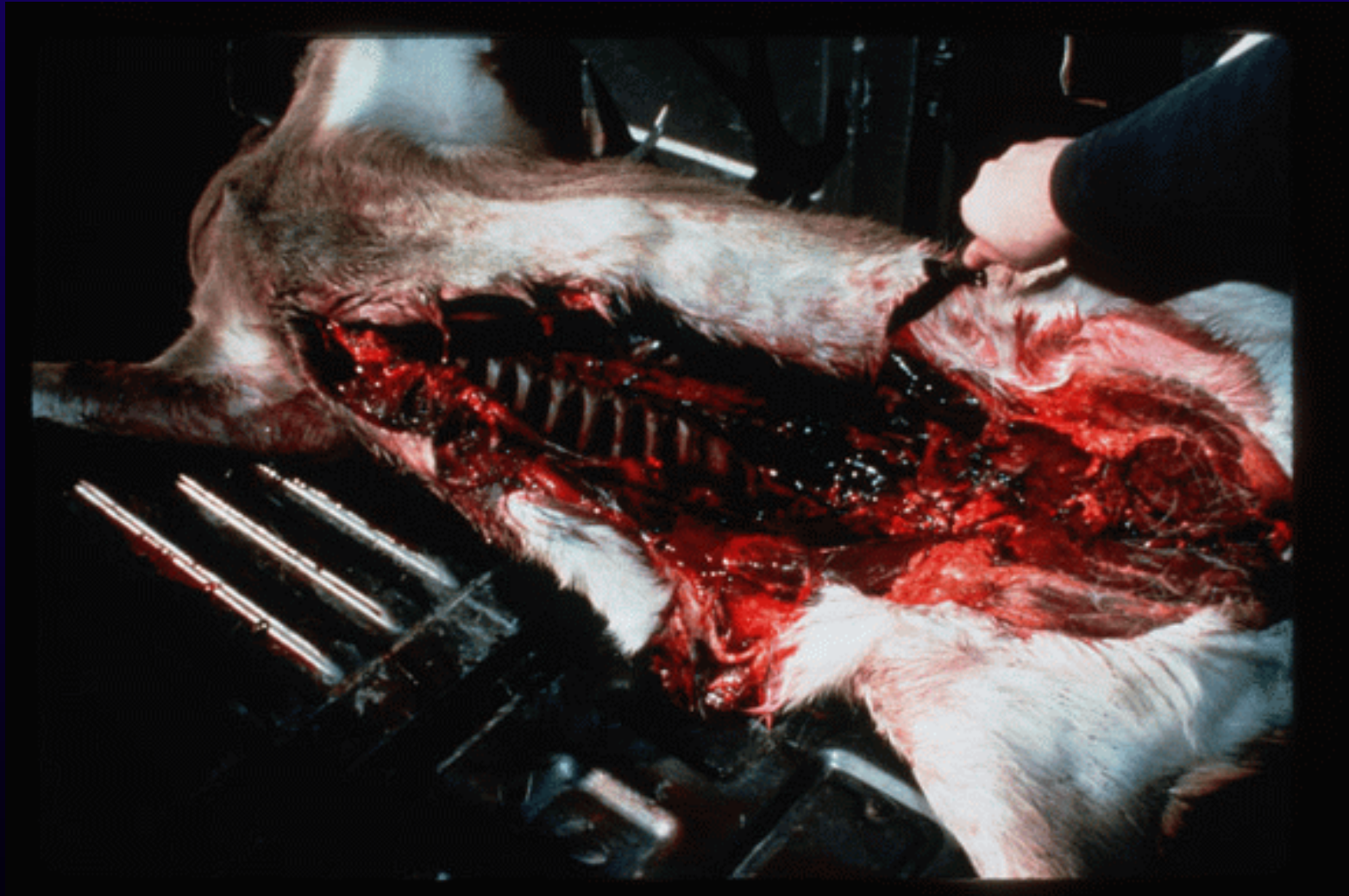


Rainfall Data 1994 - 1998, Springfield, IL



Animal Testing

- ! 196 domestic and livestock animals tested
- ! 61 wild animals (raccoons, opossums, deer, and muskrates) tested
- ! Only one raccoon and one deer had histologic evidence of renal infection



Human Testing Results

- ! Triathletes - Of 851 triathletes, 97 met the case definition and 49 were confirmed by laboratory testing
- ! Recreational Users - 278 met the case definition, 124 had some of the symptoms and 14 were confirmed by laboratory testing

Conclusions of Investigations

- ! Predominant risk factor for confirmed triathlete cases was swallowing the lake water
- ! Heavy rains may have precipitated lake contamination
- ! Recreational users of lake also affected
- ! Source of the contamination never identified

Lessons Learned

- ! No quick test to detect leptospirosis in the water
- ! Outbreak probably never would have been reported if it did not involve a large group of people that communicated with each other after the incubation period
- ! Bathing beach criteria of 235 E. coli / 100ml was used as an indicator for water quality in the lake
- ! Advisories were issued when specific areas of the lake exceeded this level; no reports of illnesses in 1999 or 2000, despite heightened awareness

Where Do We Go From Here?

Educate Public on Dangers of Swimming in Natural Bodies of Water

- ! Do not swallow the beach water
- ! Do not swim when ill or with open cuts
- ! If infants are allowed in water, use tight-fitting plastic pants
- ! Discourage waterfowl from area
- ! Use toilet facilities
- ! Do not swim in murky or stagnant water
- ! No one is able to guarantee safe water quality of natural bodies of water

Encourage Beach Operators to Voluntarily Close Facility When Water Quality is Questionable

- ! Sampling will tell results after exposure has occurred
- ! Swimming at a beach is not a necessity
- ! Financial impact of outbreak far outweighs single day loss of revenue

Continue Rapid Sample Result Efforts

- ! Will be useful to mandate closure in a timely manner
- ! Will allow for faster reopening of facilities

Maintain an Illness Reporting System

- ! How many people become ill after swimming at a beach that we are not aware of?
- ! Thousands of people swam at Illinois beaches while the 79 sets of samples that resulted in beach closures were being transported to the laboratory and analyzed, but no reports of illnesses were received
- ! Is the 235 cfu E. coli / 100ml the right level?